

THE EFFORTS TO AGAINST THE FOREST INVASIVE SPECIES IN INDONESIA; A REVIEW

Country Paper

**Presented to The Workshop on Development of a Strategy for The Asia-Pacific
Forest Invasive Species Network.**

Dehradun, India, 16 April 2006

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1. Introduction

Indonesia is one of The Mega Biodiversity Countries in the world that has high biodiversity potency. Indonesia has 10% of flowering plant in the world, 12% mammals, 16% reptiles and amphibians, 17% fishes, and 15% insects. The great potency of biological diversity roles as an important value to increase the country fiscal.

To improve the forest management, introducing of exotic flora and fauna occurred, whether it has done on purpose or not. Those exotic species have positive and negative impacts ecologically and economically. By the time, the utilization of some exotic species was out of control and at the end those species, which has adaptation capability, growth and distributed naturally or by animals invading the forests. Finally, such species became dominant and create one new ecosystem.

Existence of exotic species, which became invasive, could not be controlled, and influence the ecosystem especially for the exotic species became invasive that act as

competitor, pest, and cause genetic pollution. Not only in conservation forest area, but invasive alien species or strange invasive species, also occur in timber estate forest area, which change heterogeneous forest to be monoculture forest, that cause negative impact such as new pest and diseases. Those cases can cause distributing of ecosystem function as well as lost forest ecologically and economically.

2. Current Status of Invasive Alien Species in Indonesia

Cases of Invasive Alien Species (IAS) have been occurred in Indonesia for along time, and cause great negative impact such on several forest areas. Some cases occurred in conservation areas, i.e. Baluran National Park (NP) in East java, Ujung Kulon NP., Gunung Gede Pangrango NP. in Papua, Pangandaran Nature Reserve and Palau Moyo Game Reserve (Table 1). Other Accidents also happened in some production forests and plantation forests (Table 2)

Table-1. Invasive Species cases occurred in some conservation areas in Indonesia.

Location/ Potency	Invasive Species					
	Shrubs			Pests and Competitors		
	Species	Kind of invasion	Management effort	Species	Kind of invasion	Management effort
Wasur NP.						
Flora and Fauna	<i>Mimosa pigra</i>	Invasion to savannas		Deer(<i>Cervus timorensis</i>)	Competitor to the wallaby	Controlled hunting
	<i>Eichomia crassipes</i>	Covering the water body and hampered the growth of water biota	Biological pest	Wild pig (<i>Sus scrofa</i>)	Disturbing indirectly to thee growth off grass	Hunting
	<i>Chromolaena odorata</i>	Covering to savannas	Burning and cutting	Wild dog (<i>Canis sp.</i>)	Predator to wallaby	Hunting
	<i>Sida acuta</i>	-	Removed/pulled out	Wild cat (<i>Felis catus</i>)	-	-
	<i>Stachytarpheta urticaefolia</i>	Covering savannas	Burning and pulled out	Fresh-water fish/ grass cap	Predator and competitor to endemic fish species	Limited utilization
	Tebu rawa(<i>Banguana sp.</i>)	Covering water habitat	Pulled out	Cow	-	-
	Selada air (<i>Pistea stratiotes</i>)	Covering water habitat	-			
	Saliara(<i>Lantana camara</i>)	Covering savannas	Burning and pulled out			
	Kayu putih (<i>Melaleuca sp</i>)	Covering savannas	Slash and burned			
	Akasia (<i>Acacia sp</i>)	Covering savannas	Burning and pulled out			
	Rumput pisau(<i>Cyperaceae sp</i>)	Covering savannas	Burning and pulled out			
	Rumput tebu (<i>Praghmites karka</i>)	Covering savannas	Burned			
Baluran NP.						
Flora and fauna	<i>Acacia nilotica</i>	Covering savannas	Pulled out and herbicide	Wild buffalo (<i>Bos javanicus</i>)	Competitor	Limited utilization
Gunung Gede Pangrango NP.						
Flora and fauna	<i>Passiflora edulis</i>	Disturbing to natural vegetation	Limited utilization			
Ujung Kulon NP.						
Flora and fauna, sea and coastal areas	<i>Chromolaena odorata</i>	Covering savannas		Wild buffalo (<i>Bos javanicus</i>)	Indicated as a competitor to javan rhino (<i>Rhinoceros sondaicus</i>)	
Pulau Moyo Game Reserve						
Flora / fauna, sea and coastal	<i>Chromolaena odorata</i>	Covering savannas				
Pangandaran Nature Reserve						
Flora / fauna, coastal	<i>Lantana camara</i>	Covering the grassland area and habitat of buffalo				

Table-2. Name of Exotic Plants Attacked by Exotic Insects.

Local Name/ Botanical Name	Insect Species
Jati/ <i>Tectona grandis</i>	Ulat daun/ <i>Hiblaea puera</i> , <i>Pyrausta machaeralis</i> Dan rayap <i>Neoterms tectonae</i>
Lamtorogung/ <i>Leucaena leucocephala</i>	Kutu loncat/ <i>Heteropsylla cubana</i>
Tusam/ <i>Pinus merkusii</i> (Sumut)	Miliona basalis dan <i>Dyoryctria rubela</i>
<i>Acacia mangium</i> , sengon/ <i>Paraserianthes falcataria</i>	Xystrocera festiva
Mahoni/ <i>Swietenia mahagoni</i>	Penggerek pucuk/ <i>Hypsiphyla robusta</i>

There are some weakness in handling forest invasive species in Indonesia, such as geographical condition, where Indonesia is an archipelago consist of many islands. This condition is making us difficult to control the distribution and transportation of plants and animals between the islands. Other weakness are lack of information about alien species, limited human resources that have knowledge about invasive species, poor coordination among institutions, and undeveloped program in national level to handle the forest invasive species.

National Institutions and Regulations Related to IAS Problem Management

Three were some institutions, which involve managing the IAS's problems, i.e. Ministry of Agriculture, Ministry of Forestry, Ministry of Ocean and Fishery, and The State Ministry of Environment as a National Focal Point. Beside that, some Universities, SEAMEO Biotrope, LIPI and NGOs also supporting the program through research on bio-ecology of IAS.

To handle IAS, The government of Indonesia has several regulations and policies as operational as well as a concept.

1. National regulations to control the introduction of alien flora and fauna, are:
 - a. Act No. 5/1990 on conservation of biological diversity and its ecosystems
 - b. Act No. 16/1992 on Animal Quarantine, fish and plant.

- c. Government Regulation No. 27/1999 on Environmental Impact Assessment, emphasize on conducting IAE to every activities which has important impact to environmental, including introduction of plant species, animals, and genetic. Unfortunately, the technical guidelines on risk review and risk management related to species introduction have not established yet.
2. Participating in assignment of Convention of Biological Diversity on 5 June 1992, and ratify The Convention of Biological Diversity through Act No. 5/1994.
3. At this present, we have a national Biodiversity management strategy 2003-2020, named Indonesian Biodiversity Strategy and Action Plan, needs to be implementing effectively to minimize biodiversity crisis, including minimizing the impact of IAS. Indonesian biodiversity management strategy in national level has vision to create community of Indonesia, which care, empower, independent, and smart to conserve and utilize biodiversity optimally, fairly and sustainable through accountable management to increase community welfare, while the vision are:
 - a. To build mental and human behavior of Indonesian people, and various institutions and law instruments, in order to get awareness of conservation and utilization of biodiversity for people welfare.
 - b. To apply scientific and technology input as well as traditional role
 - c. To conserve and utilize the biodiversity proportionally
 - d. To strengthen the institution and law enforcement
 - e. To conduct the resolution of nature resources conflicts
4. Plant quarantine policy, Government of Indonesia regulated the main tasks and function of plant quarantine to apply in the harbors, airports, country border posts and inter-land harbors. The quarantine action is conduct based on the commodity kinds, i.e. food stock, horticulture, estate products and forest products. This action use SPS (Agreement on The application of Sanitary and Phytosanitary Measures), which aimed to protect life and health of plants. The plant quarantine policy that related to IAS is still in concepts or ideas, they are:

- a. Prevention of the plant species that potential to be an IAS should be conducted at all harbors based on the result of quarantine and environment risk assessment. This activity will be conducted by The agriculture Quarantine Agency collaboration with The State Ministry of Environment.
 - b. Controlling and eradicating of IAS that has already domesticated should be conducted by all institutions that related to biosecurity, i.e. Ministry of Agriculture, Ministry of Forestry, Ministry of Ocean and Fishery and State Ministry of Environment as a National Focal Point of CBD.
 - c. The handling of IAS in the entrance of harbor should hinder confusing rule that caused by unperfected various rules under convention and International agreement.
 - d. Database of domestic and international IAS should be developed in coordination by all relevant institutions.
 - e. The legal framework on IAS in Indonesia should be developed as a basic role to the risk analysis and certification system.
 - f. The CBD recommendations that related to IAS should be adopted to become a national regulations.
5. To handle the issues of IAS, some national workshops about IAS have been held in Indonesian, and resulting some recommendations:
- a. Identify and inventory of IAS including definition, and classification, and the loss impact
 - b. IAS database development, including originality, distribution, biology, ecology, benefit and determent of IAS to the people.
 - c. To consider IAS, it is necessary to decide what are the risks and benefit based on Convention on Biological Diversity.
 - d. Inventory and reviewing the law and regulations that related to IAS
 - e. Improving and developing research activities on all IAS aspects in order to respons the IAS issues in national, regional and international levels.
 - f. Set up the networking among the government, NGO and private sectors to manage the IAS in local and national levels.
 - g. Set up bilateral, regional and international collaborations

Programs and Activities To Against the Forest Invasive Species

As a national focal point of Conservation on Biological Diversity, State Ministry of Environment also acts as a national coordinator on Invasive Alien Species (IAS). Ministry of Forestry through the Directorate General of Forest Protection and Nature Conservation areas.

Some techniques have been developing to eradicate the *Acacia nelotica* in Baluran National Park, i.e. chemical, mechanic, and biologic. The result showed that mechanical technique gave better result and low risk to the ecosystem. Such technique will develop in order to control and eradicate invasive species in the park. Beside that, research on utilization of the acacia wood as a charcoal has been developing by Forest Result Technology Research and Development Center in Bogor.

In the future, Ministry of Forestry by coordinated with some institutions and NGO's will develop the strategy and action plan on managing the forest invasive species. Some programs should be creating are:

1. Strengthening the coordination among national institutions, which related to forest invasive species.
2. Develop the networking among neighbor counties in order to control and eradicate the forest invasive species.
3. Create the technical guideline to manage the forest invasive species.
4. Improve the control system the distribution and transportation of plants and animals from outside Indonesia and island to island within country.
5. Public campaign; this program will illustrate the people about what is forest invasive species, how dangerous the invasive species to the ecosystem and human live and how the invasive species can distribute in the world.
6. Training the field staff to identify and handling the forest invasive species.
7. Develop research program related to forest invasive species, e.g. bio-ecology; eradicate technique and the ecological and economical impact of forest invasive species.

Factually, it was not easy to handle, not even controlling the distribution of forest invasive species. Because of that, we need to improve the effort that we have been building before. Some programs that need to improve are national legal framework, strengthening networking, capacity building, public campaign and awareness, and law enforcement. All of those are important to anticipate the issues relating to IAS in the future.